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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/610,498	06/30/2003	Francis G. Celii	TI-34580	5368

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/610,498

Applicant(s)

CELII ET AL.

Examiner

Duy-Vu N. Deo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3, 4, 6, 7, 9 and 18-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3, 4, 6, 7, 9, 18-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 3, 4, 6, 7, 9, 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying et al. (US 2003/0176073) and Moise et al. (US 6,211,035).

Ying describes a method for forming a ferroelectric capacitor comprising: providing a dielectric oxide layer on the substrate 210 (paragraph [00161]); forming a barrier 220 over the dielectric layer (paragraph [0017]); providing a first metal Ir layer 230, a ferroelectric PZT layer 240 and a second Ir metal layer 250 in the order respectively (paragraphs [0018,00192]); forming a TiAlN hardmask over the Ir layer 250 (paragraph [0020]), etching the second Ir layer, the ferroelectric layer, and the first Ir layer using a plasma process at a T about 250-450 degrees C (paragraph [0028]). Wherein the sidewalls of the capacitor have an angle of greater than about 80 degrees (paragraph [0015]).

Ying describes etching the Ir layers using Cl₂/O₂/N₂ and the PZT using Cl₂/O₂ (table 1). Unlike claimed invention, he doesn't describe the Ir etchant includes CO and the PZT etchant includes BCl₃. Moise describes an etching method of Ir and PZT layers wherein he teaches the Cl₂ and O₂ sources can have BCl₃ in addition to the Cl₂ and CO in addition to O₂ (col. 18, line 65-col. 19, line 13). It would have been obvious for

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one skilled in the art in light of Moise, that BCl₃ and CO can be added to the etchant of the Ir and PZT layers as a source of Cl₂ and O₂ to etch the Ir and the PZT layers with a reasonable expectation of success.

Referring to claims 3, 6, and 12, applied prior art of Moise doesn't describe the gases ratios of BCl₃ and Cl₂ are from 1:4-10:1 and flow rates of the etchant of claims 18-22. However, in the absent of the unexpected result, those flow rates and concentrations would have been obvious to one skilled in the art to be determined through routine experimentation in order to provide optimum ratios of etching gases including BCl₃ and Cl₂ to etch the PZT layer with a reasonable expectation of success.

Response to Arguments

3. Applicant's argument that there is no suggestion or motivation to make the proposed modification is found unpersuasive. As taught by Moise that the Cl₂ and O₂ sources can have BCl₃ in addition to the Cl₂ and CO in addition to O₂ (col. 18, line 65-col. 19, line 13). Therefore, these gases of BCl₃ and CO are suggested to be used by Moise.

Applicant's argument about the proposed modification of Ying in light of Moise would render the prior art unsatisfactory for its intended purpose because the process in each reference is carried out at a T that categorically excludes a combination with the other reference is found unpersuasive because the modification of Ying as described above is not the T.

Applicant's argument that it would not be obvious to obtain such ratios by routine experimentation because the recited ratio range is not a result-effective variable is

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found unpersuasive because applicant has not shown that changes within the recited ratio ranges would not affect the result of the etching of the ferroelectric, the first and the second metal layers. In contrast, applicant argues that "Moise provides no hint that a ratio range may impact the sidewall profile of the capacitor stack." This would certainly show that the ratios of the etchants are result-effective variable.

In response to applicant's argument that Moise provides no hint that a ratio range may impact the sidewall profile of the capacitor stack, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duy-Vu N. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on work at home Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Duy-Vu N Deo
Primary Examiner
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8/7/06